

Table 13 — Chemical composition: carbon and carbon manganese steels

Steel	C	Si	Mn	P	S
	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)
080A15	0.13 to 0.18	0.10 to 0.40	0.70 to 0.90	0.05 max.	0.05 max.
080M15	0.12 to 0.18	0.10 to 0.40	0.60 to 1.00	0.05 max.	0.05 max.
070M20	0.16 to 0.24	0.10 to 0.40	0.50 to 0.90	0.05 max.	0.05 max.
080A30	0.26 to 0.34	0.10 to 0.40	0.70 to 0.90	0.05 max.	0.05 max.
080M30	0.26 to 0.34	0.10 to 0.40	0.60 to 1.00	0.05 max.	0.05 max.
080M40	0.36 to 0.44	0.10 to 0.40	0.60 to 1.00	0.05 max.	0.05 max.
080A42	0.40 to 0.45	0.10 to 0.40	0.70 to 0.90	0.05 max.	0.05 max.
080A47	0.45 to 0.50	0.10 to 0.40	0.70 to 0.90	0.05 max.	0.05 max.
080M50	0.45 to 0.55	0.10 to 0.40	0.60 to 1.00	0.05 max.	0.05 max.
070M55	0.50 to 0.60	0.10 to 0.40	0.50 to 0.90	0.05 max.	0.05 max.
150M19	0.15 to 0.23	0.10 to 0.40	1.30 to 1.70	0.05 max.	0.05 max.
150M36	0.32 to 0.40	0.10 to 0.40	1.30 to 1.70	0.05 max.	0.05 max.

NOTE See also 3.3 g) and option A.1, A.2 and A.4.

Table 14 — Chemical composition: case hardening steels (carbon and carbon manganese steels)

Steel	C	Si	Mn	P	S
	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)
045A10	0.08 to 0.13	0.10 to 0.40	0.30 to 0.60	0.05 max.	0.05 max.
045M10	0.07 to 0.13	0.10 to 0.40	0.30 to 0.60	0.05 max.	0.05 max.
080M15	0.12 to 0.18	0.10 to 0.40	0.60 to 1.00	0.05 max.	0.05 max.
210M15	0.12 to 0.18	0.10 to 0.40	0.90 to 1.30	0.05 max.	0.10 to 0.18

Table 15 — Chemical composition: alloy case hardening Steels^a

Steel	C	Si	Mn	Cr	Mo	Ni
	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)
635M15	0.12 to 0.18	0.10 to 0.40	0.60 to 0.90	0.4 to 0.80	—	0.70 to 1.10
637M17	0.14 to 0.20	0.10 to 0.40	0.60 to 0.90	0.60 to 1.00	—	0.85 to 1.25
655M13	0.10 to 0.16	0.10 to 0.40	0.35 to 0.60	0.70 to 1.00	—	3.00 to 3.75
665M17	0.14 to 0.20	0.10 to 0.40	0.35 to 0.75	—	0.20 to 0.30	1.50 to 2.00
805M17	0.14 to 0.20	0.10 to 0.40	0.60 to 0.95	0.35 to 0.65	0.15 to 0.25	0.35 to 0.75
805M20	0.17 to 0.23	0.10 to 0.40	0.60 to 0.95	0.35 to 0.65	0.15 to 0.25	0.35 to 0.75
815M17	0.14 to 0.20	0.10 to 0.40	0.60 to 0.90	0.80 to 1.20	0.10 to 0.20	1.20 to 1.70
820M17	0.14 to 0.20	0.10 to 0.40	0.60 to 0.90	0.80 to 1.20	0.10 to 0.20	1.50 to 2.00
822M17	0.14 to 0.20	0.10 to 0.40	0.40 to 0.70	1.30 to 1.70	0.15 to 0.25	1.75 to 2.25
835M15	0.12 to 0.18	0.10 to 0.40	0.25 to 0.50	1.00 to 1.40	0.15 to 0.30	3.90 to 4.30

NOTE See also 3.3 c), 3.3 i) and options A.2 and A.5.

^a Sulfur 0.05 % max., phosphorous 0.04 % max. for all qualities.

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Table 20 — Mechanical properties for carbon and carbon manganese steels (18)

Steel	Condition (2)	Size (1) (diameter across flats or thickness) mm	R _m N/mm ²	R _e min. N/mm ²	A min. on 5.65√S ₀ %	Impact ^a		R _{p0.2} (3) min. N/mm ²	HB (13)		
						Izod min. J	KCV min. J				
080M40	Normalized + turned or ground	≥ 6 ≤ 150	550 min. 510 min.	280 245	16 17	20	—	16	—	152 to 207 146 to 197	
		> 150 ≤ 250	660 min. 650 min. 620 min.	530 510 480	7 8 9	—	—	—	—	495 485 435	
	Hot rolled + cold drawn or hot rolled + cold drawn + ground	> 13 ≤ 16	600 min.	465	10	—	—	—	—	370	
		> 16 ≤ 40 > 40 ≤ 63 > 63 ≤ 76	570 min.	430	10	—	—	—	—	350	
080M50	Hardened and tempered + turned or ground	Q ≥ 6 ≤ 63 R ≥ 6 ≤ 19	625 to 775 700 to 850	385 465	16 16	34 34	28 28	355 450	—	179 to 229 201 to 255	
		Q ≥ 6 ≤ 63 R ≥ 6 ≤ 19	625 to 775 700 to 850	435 490	12 12	34 34	—	380 460	—	179 to 229 201 to 255	
080M50	Normalized + turned or ground	≥ 6 ≤ 150 > 150 ≤ 250	620 min. 570 min.	310 295	14 14	—	—	—	—	179 to 229 163 to 217	
		Normalized + cold drawn or normalized + cold drawn + ground	740 min. 730 min. 690 min. 680 min. 650 min.	590 585 555 540 510	7 8 8 9 10	—	—	—	—	555 545 485 420 400	
	Hardened and tempered + turned or ground	Q ≥ 6 ≤ 150 R ≥ 6 ≤ 63 S ≥ 6 ≤ 29 T ≥ 6 ≤ 13	625 to 775 700 to 850 775 to 925 850 to 1 000	390 430 495 570	15 14 14 12	—	—	—	—	360 400 465 555	179 to 229 201 to 255 223 to 277 248 to 302
		(4)	—	—	—	—	—	—	—	—	—
080M50	Hardened and tempered + turned or ground	Q ≥ 13 ≤ 150 R ≥ 6 ≤ 63 S ≥ 6 ≤ 29 T ≥ 6 ≤ 13	625 to 775 700 to 850 775 to 925 850 to 1 000	430 490 540 595	11 10 10 9	—	—	—	—	390 450 500 550	179 to 229 201 to 255 223 to 277 248 to 302
		(4)	—	—	—	—	—	—	—	—	—
^a See also option A3.											